

Greetings and welcome to the **MAY 2016** edition of the WDFW Climate News Digest. Our purpose is to provide highlights of relevant climate change news, events and resources for WDFW staff. Feedback or suggestions for items to include in future editions are much appreciated – *thanks* to those who have sent links and references and please keep them coming.

Thanks for contributions this month from Maria Hunter (DNR), Steve Jeffries, Wendy Connally, Jane Atha, George Wilhere and David Price. Other sources for news include: DNR's eMission Control newsletter, Point Blue Conservation Science, NPLCC Climate Science Digest, Climate.gov, NOAA Climate Newsletter, and "BioClimate", the newsletter of the USGS Climate Science Centers. Contact Lynn If you need information to subscribe directly to any of these.

## WHAT'S HAPPENING AT WDFW?

### **Integrating Climate Change into fish passage barrier repairs in the Chehalis**

The Habitat Program is incorporating climate change into fish passage culvert replacements funded under the Chehalis Habitat Restoration Program. Funding for these projects will include provisions for "climate adapted" designs, which use estimated future projections of bankfull width developed by WDFW and the Climate Impacts Group. See below under "Learning Opportunities" for a May 18th webinar which will overview project findings and demonstrate opportunities for application to site and watershed-scale decisions. For more information on the project, contact Lynn Helbrecht.

## CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

### **Washington State Department of Health adopts Climate Change Indicators**

Changes to our water, air, and biological systems pose increased risk to human health, and monitoring the indicators of climate change allows us to better prepare to protect public health in the face of a changing climate. The following climate change indicators and data were recently adopted by the Department of Health. Search the Washington Tracking Network to find data and create maps for climate change indicators, including car trips taken for commuting, wildfire occurrence, and flooding risk. [WTN Climate Change Landing Page](#) provides a useful overview. Specific measures can be found at the following links (you will still need to use the green button to submit and view the data). [Air Stagnation](#), [Drought-Prone Areas](#), [100-yr Flood Zone](#) / [Population in Flood Zone](#), [Paved Surfaces](#), [Wildfires](#), [People Commuting Alone](#). For questions about these indicators, please contact [Hilary Browning](#).

### **Insurance Commissioner Kriedler to host invitational Summit on Climate Change**

On June 1<sup>st</sup> Washington State Insurance Commissioner Mike Kriedler will hold a summit entitled, "Climate Risks to Washington State Insurers and Insurance Consumers." The purpose of the summit is to raise awareness among insurers of the need to consider climate risks when providing insurance products to customers and in managing their investment portfolios. Invited attendees will include Washington state and Seattle-area businesses and insurance company representatives, legislators, city, county and state government representatives, academics, and environmental and consumer advocates. The news media and TVW are also invited. The UW Climate Impacts Group staff is assisting in organizing the event.

### **Report available from tribal leaders summit on Climate Change**

The Tribal Leaders Summit on Climate Change was held in November 2015 and focused on climate adaptation planning and implementation. The meeting report summarizing the summit objectives, outcomes, presentations, and breakout sessions is now available. The summit was co-sponsored by the Southwest Climate Science Center. [View the Report >>](#)

## **NOAA Fisheries develops draft regional action plan for climate science.**

NOAA Fisheries Northwest and Southwest Fisheries Science Centers have developed a draft regional action plan for climate science in the California Current Large Marine Ecosystem and its adjacent watersheds. This plan will guide implementation of the NOAA Fisheries Climate Science Strategy and is part of a continuing effort to generate climate-related information to evaluate the effects of a changing climate on the region's trust resources - including marine and anadromous fish, invertebrates, marine mammals, sea turtles and seabirds. NOAA invites review of this plan and will accept feedback until 1 August 2016. The plan will be finalized by fall 2016.

## **RESOURCES**

### **Building an integrated U.S. National Climate Indicators System (from NOAA)**

During the development of the Third U.S. National Climate Assessment, an indicators system was recommended as a foundational product to support a sustained assessment process. The development of this system, which we call the National Climate Indicators System (NCIS), has been an important early product of a sustained assessment process.

### **Keeping Pace: A Short Guide to Navigating Sea-Level Rise Models**

The Northern Gulf of Mexico Sentinel Site Cooperative and the Southeast Climate Science Center have released a new resource - *Keeping Pace: A short guide to navigating sea-level rise models*! This quick four-pager covers the importance of sea-level rise model selection, helpful concepts, model categories, and an example of how to utilize these models to address coastal issues. [Learn More >>](#)

### **How to talk about Climate Change** (from GRIST)

Talking about climate change is harder than it sounds (imagine a game of charades in which you must suddenly convince your friends they're in imminent, life-threatening danger). The threat is too big to grasp and the straight facts are not enough to get most people engaged — so how can you spur them to take action? Over the past year, the authors asked experts — activists, [psychologists](#), [policy wonks](#), even [therapists](#) — for their best advice. The conclusion is that there is no one-size-fits-all approach, but there are some broad do's and don'ts to help you get your message across.

### **Can wildlife adapt to climate change?**

A TED-Ed original presentation. With rising temperatures and seas, massive droughts, and changing landscapes, successfully adapting to climate change is increasingly important. For humans, this can mean using technology to find solutions. But for some plants and animals, adapting to these changes involves the most ancient solution of all: evolution. Erin Eastwood explains how animals are adapting to climate change.

## **LEARNING OPPORTUNITIES**

**May 5<sup>th</sup>, 2:00-3:30 pm**, webinar and presentation at the Department of Ecology, **“Highlighting the technical and community engagement work of the Skagit Climate Science Consortium”**. Hosted by the Ecology Climate Science Network – presentation location will be the Department of Ecology Auditorium, Lacey, WA. **The Skagit Climate Science Consortium (SC2)** will provide an overview of their work and highlight recent research projects.

WebEx Meeting Connection [here](#). Meeting Number: 927 753 802, Meeting Password: Pickett1.

**May 18<sup>th</sup>, 10:30-11:30 am**, (Pacific), webinar, **Integrating Climate Change into Culvert Design**, a presentation of the results of a two-year WDFW project to translate projected future changes in regional climate to stream width, a key parameter for fish passage culvert design and sizing. Join presenters from WDFW as they discuss results and ideas for how to apply project results to site and watershed scale decisions.

[Register here.](#)

**June 2, 2016 10:00 am (Pacific)**, webinar, **"A Methodology for Assessing the Vulnerability of Fish & Invertebrates to Climate Change"**.

Wendy Morrison of NOAA will present the NOAA Fisheries Fish Species Climate Vulnerability Assessment Methodology that uses information on species life history characteristics, species distributions, and projected future climate and ocean conditions to estimate the relative vulnerability of fish species to changes in abundance or productivity (and to some extent distribution).

[Click here](#) for more information.

**June 14-16, 2016**, online training, 8:00 am to 3:00 pm (Pacific) daily. **"Training: Sedimentation Impacts Under Climate Change"**

The COMET Program and the Climate Change and Water Working Group (CCAWWG) are pleased to announce the second *Sedimentation Impacts Under Climate Change (SIUCC)* course. The course is being offered with financial support from the U.S. Army Corps of Engineers and the U.S. Bureau of Reclamation. The SIUCC course is part of Professional Development Series, "Assessing Natural Systems Impacts under Climate Change."

**July 11-15, 2016, Climate-Smart Conservation with Scenario Planning Course at NCTC**

A five-day course on climate change conservation planning will be offered July 11-15, 2016 at the National Conservation Training Center in Shepherdstown, WV. The first half of the course is designed to demystify climate adaptation information, tools, and models for application to on-the-ground conservation. The second half of the course will expose participants to a range of approaches and give them hands-on experience with specific scenario development and application techniques. [Learn more >>](#)

## CLIMATE SCIENCE NEWS

**Climate change is causing the Earth's poles to drift** (from Chris Mooney, *The Washington Post*)

Sophisticated new gravity research suggests that changes in Earth's climate may actually be having a stunning geophysical effect: slightly moving the location of the planet's spin axis, or axis of daily rotation. In other words, even as the Earth spins on its axis in a west to east direction, completing a full rotation every 24 hours, that axis itself is also moving. This, in turn, means that the physical North and South poles are actually shifting, with the North Pole now drifting towards the United Kingdom.

**Arctic's winter ice extent is the smallest on record**

The 2016 winter maximum sea ice extent in the Arctic edged out 2015 to set a new record low. [Read more...](#)

**Office of the State Climatologist April newsletter** is now available on the [website](#).

Topics include: March climate summary, snowpack and drought update (hint: it's good news!) and temperature and precipitation outlook

**A scientific panel warns that increases in global carbon dioxide emissions are acidifying waters of the North American West Coast at an accelerating rate**

[The West Coast Ocean Acidification and Hypoxia Science Panel](#) recently released a final report which summarizes the state of the science around this issue and outlines a series of potential management actions that the governments of the states of California, Oregon, and Washington, and the province of British Columbia, can immediately begin implementing to offset and mitigate the impacts of ocean acidification. Because of the way the Pacific Ocean circulates, the North American West Coast is exposed to disproportionately high volumes of seawater at elevated acidity levels. Already, West Coast marine shelled organisms are having difficulty forming their protective outer shells, and the West Coast shellfish industry is seeing high mortality rates during early life stages when shell formation is critical. The acidity of the world's oceans is anticipated to continue to accelerate in lockstep with rising atmospheric carbon dioxide emissions.

The Panel was convened in 2013 to explore how West Coast government agencies could work together with scientists to combat the effects of ocean acidification and a related phenomenon known as hypoxia, or low dissolved oxygen levels.

### **Marine heatwaves – tracking since 1950 suggests they are increasing** *(from the University of Washington)*

In a new research paper published in the journal *Geophysical Research Letters*, University of Washington oceanographer and doctoral student Hillary Scannell looks back through 65 years of warming events in both the North Atlantic as well as the North Pacific oceans. Scannell and her collaborators' work suggests that land-based heatwaves are becoming more frequent and more intense due to climate change.

### **March boasted unprecedented warmth across continental US** *(from Climate.gov)*

If you were alive during March 2016, you witnessed U.S. history. One stunning feature from the March 2016 temperature map was just how universally warm the month was. Every one of the 357 [climate divisions](#) across the contiguous United States and Alaska ended up - at least - in the "warmer than normal" category. That's harder than it sounds: it means each of those divisions ended up in the *top third* of their own histories.

### **Clouds aren't reflecting as much solar radiation as previously calculated** *(from Climate Change; Impacts and Responses)*

"Clouds, once thought to be shields against global warming, may not be doing their jobs with as much intensity as previously thought. In fact, new satellite data shows multiple warning signs indicating a rapidly deteriorating climate. As surface temperatures continue to rise across the world, previous climate models indicated that clouds could partially negate the effects of global warming and shield the earth from the solar radiation that fuels the rise in global temperatures. However, new research suggests scientists may have significantly overestimated their abilities". [Read More ...](#)

## **SPECIES AND HABITATS**

### **What affects fire behavior more, climate or fuels?** *(Research Brief from the California Fire Science Consortium)*

### **Last year's heat wave doomed nearly all Okanogan sockeye salmon** *(from Hal Bernton, the Seattle Times)*

A report presented to the NW Power and Conservation Council indicates that amid last summer's drought and heat wave, some 98 percent of Okanogan basin sockeye salmon died before they reached upstream spawning grounds.

**Minimizing Species' Global Change Risk through Genetic Diversity** *(from the National Climate Change and Wildlife Science Center)*

What do the Irish potato famine and aquatic communities have in common? In this blog post on the Early Career Climate Forum, Abby Lynch, research fisheries biologist with the National Climate Change and Wildlife Science Center, discusses the importance of genetic diversity in helping buffer species from the effects of global change, including climate change. [Learn more >>](#)

**New Technique Tracks "Heartbeat" of Hundreds of Wetlands in Eastern Washington** *(from the National Climate Change and Wildlife Science Center)*

The wetlands of eastern Washington's Columbia Plateau provide critical habitat for a range of species, yet scientists lack basic information about their locations, since small wetlands are often not captured by coarse-resolution remote sensing. To address this gap, University of Washington researchers, funded by the Northwest CSC, are applying a special image analysis technique that detects the unique ways in which wetlands emit and reflect light (known as their "signatures"), allowing them to identify small wetlands and track their water level changes over time. [Learn more >>](#)

**Eight Animals Feeling the Heat from Climate Change** *(from the National Climate Change and Wildlife Science Center)*

From forest to grassland, desert to ocean, many wildlife species are already "feeling the heat" from climate change. Here are eight animals that highlight some of the research being done by the Climate Science Centers and the National Climate Change and Wildlife Science Center and provide a glimpse into how climate change is impacting wildlife across the country. [Learn more >>](#)

**Old-growth forests in the Northwest have the potential to make the extremes of climate change less damaging for wildlife** *(from Science Advances and Oregon Public Radio)*

New research out of Oregon State University shows complex forests do a surprisingly good job of regulating temperature on the ground – even compared to fully mature tree plantations.

**Trees' Internal Water Pipes Predict Which Species Survive Drought** *(from ScienceDaily.com)*

Massive tree die-offs due to drought have ravaged forests across the American West and left ecologists struggling to predict how and when tree deaths will happen, and how rising temperatures due to climate change might affect the health of forests. In this new study, researchers find that the species most resistant to drought are those that are better at withstanding stress to the water transport system -- composed of internal pipes known as xylem -- that carries water from the roots to the crown.

**Climate Change Refugia, Fire Ecology and Management**

Refugia are habitats that buffer climate changes and allow species to persist in—and to potentially expand under—changing environmental conditions. This paper suggests that cold-air pools (areas with lower temperatures and higher moisture) act as an important type of small-scale refugia, having fewer fires and fires of lower severity. Active management, such as restoration and fuels treatments for climate change adaptation, may be required to maintain these distinctive and potentially important refugia. Interestingly while overall temperatures are increasing the weather patterns that cause cool-air pooling at the landscape scale are increasing, at least in the Sierra Nevadas, so the frequency and duration of cold-air pools may actually increase with climate change.

Wilkin, K.M., D.D. Ackerly and S.L. Stephens. 2016. Climate Change Refugia, Fire Ecology and Management. *Forests*, 77(7).

## **US Climate Change Risks & Preparedness, State-By-State**

Climate Central has released the first-ever national analysis of state-level preparedness for climate change-driven, weather-related threats. States at Risk: America's Preparedness Report Card summarizes the changing nature of key threats and the corresponding levels of preparedness in each of the 50 states. The report's goal is to galvanize state action regarding climate change. Researchers assigned school-style letter grades to each location based on three criteria: State assessment and public awareness of the threats; plans being formed; and plan implementation.

### ***How Washington scored relative to other states in climate preparedness***

Washington faces considerable and significantly increasing threat levels from extreme heat, drought, wildfire, inland flooding, and coastal flooding between now and 2050. Washington earns an overall grade of B+ on the Report Card, with grades ranging from a D- for extreme heat to an A for wildfire. The grades are relative to other states, and relative to the magnitude of the climate threats themselves. Washington has taken *strong action* to prepare for its current climate risks and a *fair amount* of action to understand and plan for its future risks. The state has developed a detailed climate change adaptation plan, although state agencies have so far *taken limited* action to implement recommended strategies in the plan.

## **Resettling the first American climate refugees** *(from the New York Times).*

"In January, the Department of Housing and Urban Development announced grants totaling \$1 billion in 13 states to help communities adapt to climate change, by building stronger levees, dams and drainage systems. One of those grants, \$48 million for Isle de Jean Charles, is something new: the first allocation of federal tax dollars to move an entire community struggling with the impacts of climate change. The divisions the effort has exposed and the logistical and moral dilemmas it has presented point up in microcosm the massive problems the world could face in the coming decades as it confronts a new category of displaced people who have become known as climate refugees."

## **Updates for the Clean Air Rule** *(from the Department of Ecology)*

The Washington Department of Ecology held a recent webinar about the Clean Air Rule, sharing the latest updates and options for the draft Rule they expect to release in late May. If you were unable to attend the webinar you can watch the recording or download the presentation slides on our website.